

XLV.—*The Morphology of some Cretaceous Cirripedes.*

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[Plate V.]

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THIS may be taken as a continuation of my paper on "Some Cretaceous and Tertiary Cirripedes referred to *Pollicipes*" (Ann. & Mag. Nat. Hist. 1914, ser. 8, vol. xiv. pp. 167–206, pls. vii., viii.). While I had the intention later of taking up the study of the species included here, the material at my command does not allow me at present to deal with them in such a comprehensive manner as I should like; but the fact that a species of this group has to be included in my account of the Rügen Chalk Cirripedes has compelled me to write the present note.

In the Cretaceous rocks are found quite commonly certain simple types of Cirripede valves that have been in the main ascribed to various species of *Pollicipes*. The geologically oldest of these is *Pollicipes bronni*, Roemer, from the Middle Neocomian (Hilsconglomerat) of Essen, Westphalia, hitherto known only by the carina, but we are now able to add the scutum and tergum (Pl. V. figs. 11, 12). This is followed in the Albian by the common *Pollicipes unguis*, J. de C. Sowerby, from the Gault of Folkestone, Kent, and *Pollicipes imbricatus*, Withers, from the Blackdown Beds of Blackdown, Devonshire, and in the Chalk by *Pollicipes glaber*, Roemer, and a number of allied species. It would appear that *P. glaber* is the direct descendant of *P. unguis*, and from *P. glaber* has arisen at different horizons in the Chalk a number of forms that are sufficiently distinct to warrant authors in giving them specific rank.

The following are the species considered by me in this paper as constituting a single natural group, but when these species come to be studied more carefully in detail there is no doubt at all that the number will be decreased:—

Danian—Cenomanian:

Pollicipes angelini, Darwin (carina and tergum only).*Scalpellum attenuatum*, H. Woodward.*Pollicipes billaulti*, Peron.„ *conicus*, Reuss.*Pollicipes?* *corrugatus*, H. Woodward.*Pollicipes costatus*, Kafka.„ *cuspidatus*, Kafka.

Pollicipes filusus, Withers.

„ *gamigensis*, H. B. Geinitz.

„ *glaber*, F. A. Roemer.

Scalpellum longissimum, Withers.

„ *oppoliense*, Leonhard.

Pollicipes striatus, Darwin.

„ „ var. *paucistriatus*, H. Woodward.

Albian :

Pollicipes unguis, J. de C. Sowerby.

„ *imbricatus*, Withers.

Neocomian :

Pollicipes bronni, F. A. Roemer.

All the species enumerated above were founded on detached valves, and in the case of *P. unguis* and *P. glaber* only has any number of valves been found in their natural position. All the valves have apical umbones. The carina, where known, is simple in structure, and by this I mean that it is not separated by means of ridges or alteration in direction of growth-lines into tectum, parietes, and intraparietes, for these parts are not defined, and the valve is strongly convex to flatly-arched in transverse section. The scutum, in addition to the apico-basal ridge, has a second ridge, more or less prominent in the several species, extending from the apex to about the middle of the basal margin, and like the Arcoscalpellids has a comparatively wide tergo-lateral portion, which, however, varies in width in the several species. The tergum is not in any way peculiar, but the valve is usually rounded and protuberant along the occludent margin, followed by a rather wide furrow extending to the scutal margin. The upper latus is rather simple, and forms almost an equilateral triangle, with the scutal side a little longer than the tergal, but with no elaboration of structure, such as the truncation of the basal angles and the growth-lines upturned at the sides. Of the lower latera, the carinal latus is the valve more frequently found, and this is subtriangular to oblong in shape, and is about twice as large as the rostral and inframedian latus, which are almost exactly similar in shape and size. The rostrum is subtriangular, large, and wide, usually with an apico-basal ridge. The peduncular plates are large, with a smooth, narrow, inwardly-projecting ledge; on the inner margin of this ledge in the plates belonging to *P. unguis* there is a median elliptical socket, but I have not noticed such a feature in the numerous peduncular plates that I have seen of *P. glaber*.

Pollicipes glaber would in itself appear to be an extremely variable form, but whether the allied forms, occurring mainly in the upper zones of the Chalk, are really offshoots from that species, or whether they constitute closely-allied and parallel species, can be determined only by getting together a collection of properly-collected material from different horizons. I have already gone some way in this direction, but the purport of this paper is not to discuss the species so much as to work out the structure of the capitulum, and to gain some idea as to the phylogenetic position of the group of species.

Since most of the evidence is exhibited by the species *Pollicipes unguis*, we will now proceed to discuss the material, but it would seem unnecessary here to describe the valves of this species in detail, since this has already been done by Darwin, and myself in the case of the scutum.

Scalpellum (Cretiscalpellum) unguis (J. de C. Sowerby).
(Pl. V. figs. 1-10.)

1836. *Pollicipes unguis*, J. de C. Sowerby, Trans. Geol. Soc. ser. 2, vol. iv. p. 335, pl. xi. fig. 5*.
 1836. *Pollicipes levis*, J. de C. Sowerby, *ibid.* pl. xi. fig. 5 (non pl. xvi. fig. 1).
 1845. Non *Pollicipes unguis*, J. de C. Sowerby; A. Reuss, Böhm. Kreidef. p. 17, pl. v. fig. 44.
 1850. *Pollicipes unguis*, J. de C. Sowerby; H. B. Geinitz, Das Quadersandsteingeb. p. 100.
 1850. *Pollicipes levis*, J. de C. Sowerby; H. B. Geinitz, *ibid.* p. 100.
 1851. *Pollicipes unguis*, J. de C. Sowerby; C. Darwin, Pal. Soc. Monogr. Foss. Lepadidæ, p. 64, pl. iv. fig. 1.
 1854. *Pollicipes unguis*, J. de C. Sowerby; C. Darwin, Ray Soc. Monogr. Subclass Cirripedia, Synop. et Index Systematicus, p. 637.
 1854. *Pollicipes unguis*, J. de C. Sowerby; J. Morris, Cat. Brit. Foss. 2nd ed. p. 96.
 1865. *Pollicipes unguis*, J. de C. Sowerby; Salter and H. Woodward, Cat. & Chart Foss. Crustacea, p. 27, pl. i. fig. 6.
 1877. *Pollicipes unguis*, J. de C. Sowerby; H. Woodward, Brit. Mus. Cat. Brit. Foss. Crustacea, p. 141.
 1886. Non *Pollicipes unguis*, J. de C. Sowerby; J. Kafka, Sitz. Ber. k. Böhm. Gesell. Wiss. Prag (1885), p. 573 (= *P. glaber*, Roemer).
 1887. Non *Pollicipes unguis*, J. de C. Sowerby; Fritsch and Kafka, Crust. Böhmischen Kreidef. p. 12 (= *P. glaber*, Roemer).
 1910. *Pollicipes unguis*, J. de C. Sowerby; Withers, Geol. Mag. dec. v. vol. vii. p. 498, text-figs. 4, 5 a, b.

Diagnosis.—Carina bowed inwards, comparatively wide at the base, and the basal margin bluntly pointed and usually somewhat rounded; rostrum subtriangular, bowed inwards, and transversely convex; carinal latus with the upper and

lower margins subparallel, and the lateral and carinal margins almost equal in length, the valve being somewhat oblong in shape.

Distribution.—Albian, Gault: Folkestone, Kent; Dienville (Aube), France.

J. de C. Sowerby (1836, pl. xi. fig. 5*) established the species *Pollicipes unguis* on two valves, which presumably represent a rostrum and a carinal latus, and at the same time (1836, pl. xi. fig. 5) gave the name *Pollicipes levis* to a carina and two terga which really belong to *Pollicipes unguis*.

Darwin (1851, p. 64, pl. iv. fig. 1) for good reasons thought it advisable to adopt the name *P. unguis* in preference to *P. levis*, and he figured a number of detached valves, mostly fragmentary, said by him to belong to a single individual. They comprised "a carina and pair of terga, much mutilated, a rostrum, sub-rostrum, a pair of upper latera, a pair of latera of the lower whorl from the carinal end of the capitulum, and two other latera of this same whorl from one side of the rostral end of the capitulum." From Darwin's statement as to the incompleteness of the terga and carina, as well as from the present state of the specimens, which are in the Geological Survey Museum, registered 31378, it is quite evident that other specimens must have been used in the drawing of the figures. The carina could not have been drawn from the present fragment, for a part is present which is broken off in Darwin's figure, and the terga, which Darwin himself said were much mutilated, must have been very much restored. The upper latus is drawn much too symmetrically. None of the figures of the lower latera are very accurate, and the subrostrum has apparently been lost, since it is not with the other valves.

With regard to the lower latera, Darwin further said (1851, p. 66): "these consist of two small [attached] valves (*l, k*), namely (judging from the position in which, overlapping each other, they were embedded), the first and second, or more probably the second and third right-hand rostral latera of the lower whorl; and a pair (*h, i*) (right-hand and left-hand) of latera, of about twice the size of the two anterior ones, which must have come from the carinal half of the whorl, but the exact position of which I cannot tell."

Concerning the number of valves, Darwin said (1851, p. 67): "With respect to the number of valves in the whole capitulum, it is almost useless to speculate: we have two scuta, two terga, two upper latera, two rostra, and we may, perhaps, infer two carinæ, making ten valves, we know of

three pair of lower latera, making sixteen valves: I believe there must have existed some other latera, but probably only a few more; for these valves, especially the carinal pair, are much larger, in proportion to the scuta and terga, than in any recent *Pollicipes*. Probably the lower latera, together with the sub-rostrum, and perhaps a sub-carina, formed only a single lower whorl."

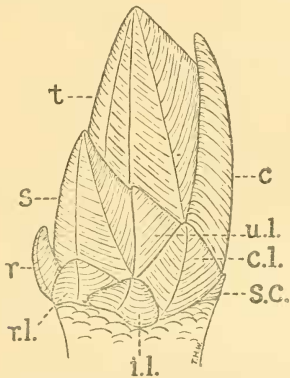
For some years now I have not been altogether satisfied in my own mind with Darwin's interpretation of these remains, and more especially their reference to the genus *Pollicipes*, but, in view of Darwin's opinion as to the number of valves forming the capitulum, it was necessary to get proof before raising any discussion, and by the preparation of a number of specimens this has now been obtained.

In 1910 (p. 499, text-fig. 4) I figured a small incomplete capitulum of *P. unguis* showing the right side, and this consisted of the carina, scutum, tergum, upper latus, and carinal latus. That specimen not only showed the scutum, unknown to Darwin, but the valves were preserved in their natural position, and it proved the position of the carinal latus. Darwin certainly did recognise this latter valve of *P. unguis* as a carinal latus, but, curiously enough, the homologous valve in the closely-related species *P. glaber* (1851, pl. iii. fig. 10*l*) was regarded by him as a "Latus (probably from near the rostrum)."

Two specimens carry the evidence a stage further. One (Pl. V. fig. 1) in the Geological Department of the British Museum, registered 59802, exhibited the inner surface of the valves of the right side of an incomplete capitulum, and, when these were filled with plaster and the matrix taken away from their upper surface, the valves were seen to be almost in their natural position and to consist of the carina, tergum, carinal latus, and inframedian latus. The second specimen (Pl. V. fig. 2) is in the Sedgwick Museum, Cambridge (Wiltshire collection), and exhibits the carina, and on each side the carinal latus, followed by the left and right inframedian latus.

Turning now to other specimens in the Geological Department of the British Museum, one, registered 44300, shows remains of more than one capitulum. From this specimen were obtained five peduncular plates, of which two are figured (Pl. V. figs. 9, 10). There is on the matrix, in addition to a carina, paired terga, and upper latus, a left carinal latus and two other lateral valves attached together (Pl. V. fig. 3). Now one of these last two valves is the opposing valve of that which we know from specimen 59802

(Pl. V. fig. 1) to be the inframedian latus, and it follows from this that the other valve must be the rostral latus. Two similar valves were exhibited apart from each other on specimen I. 1573 (Pl. V. figs. 4 *a, b*), and these may have belonged to a single individual. In both specimens 44300 and I. 1573 the two valves, although much larger, are exactly similar in structure to the two attached valves (Pl. V. fig. 5) figured by Darwin (1851, pl. iv. fig. 1 *k*), and consequently the latter valves are the *left* rostral and inframedian latus, and not right-hand valves as supposed by Darwin. Moreover, in all the specimens, these two valves



Scalpellum (Cretiscalpellum) unguis (J. de C. Sowerby). Albian, Gault: Folkestone, Kent. Restoration of capitulum.

c, carina; *s*, scutum; *t*, tergum; *u.l.*, upper latus; *c.l.*, carinal latus; *i.l.*, inframedian latus; *r.l.*, rostral latus; *r*, rostrum; *s.c.*, subcarina.

show that the rostral latus was not only overlapped by the inframedian latus, but the two valves are very similar in shape and size. Consequently, if the rostral latus was placed in position beneath the inframedian latus in the specimen 59802 (Pl. V. fig. 1), there would be no room for further latera.

So far, then, we have proved that the capitulum consisted of a carina, two scuta, two terga, two upper latera, and three pairs of lower latera only, making thirteen valves in all. In addition, we know that there was a large rostrum, and Darwin figured a valve which he called a subrostrum. I cannot conceive how the latter valve could have formed part of

the rostral end of the capitulum, especially beneath such a large wide plate as the rostrum actually is, and in my opinion it is a subcarina, for which there is room between the carinal latera—otherwise there would be a hiatus between the incurved outer margins of these valves.

The capitulum has therefore fifteen valves only of which there is any proof, and, in view of the large size of the lower latera, it is extremely unlikely that there were any more. Had there been more it is quite certain that fragments would have turned up in the large amount of material that I have examined, for several other specimens exhibit lower lateral valves and in some cases the peduncular plates. While Darwin thought that there were more than three pairs of lower lateral valves, he was of the opinion that there was only a single lower whorl, and, since it has now been shown that there could have been only three pairs of latera, there remains no justification, quite apart from other considerations, for the reference of this form, and by inference the related species, to the genus *Pollicipes*. A restoration is given of the capitulum, and except in the case of the rostrum and subcarina, the exact position of each valve is proved by one or other of the specimens discussed here.

Evidence for this restoration is just as strong in the case of the allied species *Pollicipes glaber* from the Chalk Marl. Precisely similar valves to those known to comprise the capitulum of *P. unguis* have been found detached, including a great number of the peduncular plates, and the absence of any other type of valve, although negative evidence, is strong confirmation of the above conclusion.

The structure of the capitulum of *P. unguis* shows that it represents a type distinct from those already known, but, in deference to the views of certain eminent authorities on recent Cirripedes, I refrain from making it a distinct genus, and content myself with regarding it as a subgenus of the genus *Scalpellum*, s. str., definable as below:—

CRETISCALPELLUM, subgen. nov.

Scalpellids with the upper whorl of valves as in the subgenus *Arcoscalpellum*, except that the carina is simple (that is, not divided off into tectum, parietes, and intraparietes), and with three pairs of large practically undifferentiated lower lateral valves, of which the inframedian latus overlaps the rostral and carinal latus on either side; rostrum exceptionally large and wide; peduncular plates large with a smooth, narrow, inwardly-projecting basal ledge.

Subgenotype.—*Scalpellum* (*Cretiscalpellum*) *unguis* (J. de C. Sowerby).

Scalpellum (Cretiscalpellum) bronni (F. A. Roemer).
(Pl. V. figs. 11–16.)

1841. *Pollicipes bronni*, Roemer, Verst. Norddeutschen Kreidegeb. p. 103, pl. xvi. fig. 8.
1845. Non *Pollicipes bronni*, Roemer; A. Reuss, Verst. d. Böhmisches Kreidef. p. 16, pl. v. figs. 40, 41, pl. xii. fig. 4 (= *P. glaber*, Roemer).
1845. Non *Pollicipes bronni*, Roemer; H. B. Geinitz, Grundriss der Versteiner. p. 247, pl. ix. fig. 22 (= *P. glaber*, Roemer).
1850. *Pollicipes bronni*, Roemer; H. B. Geinitz, Das Quadersandsteingeb. p. 100.
1851. *Pollicipes bronni*, Roemer; Darwin, Pal. Soc. Monogr. Foss. Lepididæ, p. 77, pl. iv. fig. 10.
1852. *Pollicipes bronni*, Roemer; F. A. Quenstedt, Handb. der Petrefaktenkunde, p. 304, pl. xxi, figs. 17 a-c.
1854. *Pollicipes bronni*, Roemer; Darwin, Ray Soc. Monogr. Subclass Cirripedia, Synop. et Index Systemat. p. 639.
1865. *Pollicipes bronni*, Roemer; Salter and H. Woodward, Cat. & Chart Foss. Crustacea, p. 27, pl. i. fig. 7.
1877. *Pollicipes bronni*, Roemer; H. Woodward, Brit. Mus. Cat. Brit. Foss. Crust. p. 139.
1883. *Pollicipes bronni*, Roemer; F. A. Quenstedt, Handb. der Petrefaktenkunde, 3rd ed. Abth. ii. p. 467, pl. xxxvii. fig. 9.
1886. Non *Pollicipes bronni*, Roemer; J. Kafka, Sitz.-Ber. k. Böhm. Gesell. Wiss. Prag (1885), p. 570, pl. ii. figs. 3 a-c (= *P. glaber*, Roemer).
1887. Non *Pollicipes bronni*, Roemer; Fritsch and Kafka, Crust. Böhmisches Kreidef. p. 9, fig. 14 (= *P. glaber*, Roemer).
1889. Non *Pollicipes bronni*, Roemer; A. Fritsch, Arch. naturw. Landesd. Böhmen, Prague, Bd. vii. p. 95, fig. 118 (= *P. glaber*, Roemer).
1889. Non *Pollicipes bronni*, Roemer; A. Peron, Bull. Soc. Sci. Yonne, Tom. xli (1887), p. 252 (= *P. glaber*, Roemer).

Diagnosis.—Carina smooth, subcarinated, with the lower part of the valve unusually wide, and its upper part almost always bowed outwards. Scutum with the whole tergo-lateral portion bent almost at right angles to the remainder of the valve. Tergum with the upper carinal margin unusually short, being about one-third the length of the lower carinal margin.

Remarks.—Hitherto this species has been represented by the carina only. It is therefore an important addition to be able to add the scutum and tergum. The scutum and tergum doubtfully referred by Peron to this species came from the Cenomanian chalk, and are almost certainly referable to *P. glaber*.

Distribution.—Middle Neocomian, Hilsconglomerat: Essen-on-the-Ruhr, Westphalia.

Material.—Several valves of this species from the type-locality are in the Geological Department of the British Museum, and comprise eleven carinæ, registered I. 14031,

I. 15447-I. 15456, and another more important set comprising two carinae (I. 15443-4), one scutum (I. 15445), and a tergum (I. 15446).

Measurements.—The following are the measurements of the scutum and tergum, and the largest carina :—

	Length. mm.	Breadth. mm.
Carina (Pl. V. fig. 15)	22·1 (when complete probably about 25 mm.).	11·2
Scutum (Pl. V. fig. 11)	18·2	9·3
Tergum (Pl. V. fig. 12)	17·3	8·4

Description.—All the valves of this species seen by me from Essen are much worn, and the comparatively coarse sand-grains composing the matrix have in most cases pitted the surface of the valves. From certain valves that are well preserved it would appear that the surface was originally smooth, except for the faint transverse growth-lines.

Carina triangular, unusually wide, about twice as high as wide, subcarinated, transversely semicircular, with the lateral margins slightly inflected, basal margin angular, formed of two curved lines making an angle of about 90°, the outer angles being produced into short spurs; the apical part of the valve is almost always bowed outwards to a variable extent. The growth-lines follow the outline of the basal margin, but on the inflected lateral edges they are slightly, but rather abruptly, upturned. On the inner surface the lower two-thirds of the valve is deeply concave, and the upper third of the valve is thick and solid, and no doubt freely projected to that extent. Two ridges, much more prominent in some valves than in others, and thickest in the middle, are produced on the solid apical portion, and they project beyond the lateral margins, from which they are separated by a distinct furrow.

Scutum subtriangular, moderately convex transversely, with the tergo-lateral portion abruptly bent downwards and inwards from the somewhat raised and rounded apico-basal ridge; ocludent margin moderately convex; basal margin almost straight, about half the width of the ocludent margin. On the inner surface the inner ocludent edge is moderately wide and marked with longitudinal lines; there is no very deep pit for the adductor muscle, but above the pit the valve is thick and solid; the apical part of the tergo-lateral edge is broken in this specimen, but it appears to have been much produced inwards, forming a fairly deep furrow between it and the flattened inner ocludent edge.

Tergum subrhomboidal with a straight apico-basal ridge,

rather steeper on the carinal side, and a little nearer to the carinal than to the scutal angle. The surface of the valve slopes fairly evenly each side of the ridge. The upper and lower carinal margins are straight, the upper carinal margin being about one-third the length of the lower, and forming with it an angle situated about one-fifth the length of the valve from the apex; ocludent margin slightly convex, a narrow rim along this margin being somewhat protuberant and divided off from the rest of the valve by a parallel depression which is wider towards the scutal margin; scutal margin almost straight, slightly produced below the protuberant ocludent rim, and forming with the ocludent margin an angle situated nearly two-thirds the distance from the apex. On the inner surface the inner ocludent edge is rather narrower than the upper carinal edge, but both edges are narrow and are marked with growth-lines indicating that only a very small part of the valve freely projected.

Remarks.—This species is characterised not only by its unusually wide and outwardly bowed carina, but by the way in which the inner infilled apical part of that valve is produced into the two lateral and inwardly projecting ridges. Of the specimens from Essen one only (I. 15419) is not outwardly bent, but this is practically straight and cannot be said to be bowed inwards. It would seem therefore to be a fairly constant character for the carina to be bowed outwards, although in some recent species this feature is often variable. I have not seen a carina of the Gault *P. unguis* that is bowed outwards, but of the Chalk *P. glaber* one does rarely come across carinae that are strongly bowed outwards. The scutum of *P. bronni* is peculiar in the strong inflection of the tergo-lateral portion, and the tergum in the shortness of the upper carinal margin.

I have not seen any examples of the carina from the Warminster beds referred by Darwin to this species, but, since the outward bending of the carina seems to be such a constant character of *P. bronni*, I am not at all sure that the Warminster form which is bowed inwards—and what is more important has a more tapering form—can be the same species.

PHYLOGENETIC POSITION.

The capitulum of *Cretiscalpellum* is remarkably erect and *Scalpellum*-like, and quite unlike the short and rather squat multi-valved capitulum of *Pollicipes* (*Mitella*). In the general build of the capitulum, and the relative position of

the valves, there is much resemblance to the forms of *Scalpellum* included in the subgenus *Arcoscalpellum*. This is more especially marked in the case of the upper whorl of valves which agree almost exactly in disposition, and except for the more simple carina, which is not divided off into tectum, parietes, and intraparietes, there are no distinguishing features. While there is a somewhat similar disposition of the lower whorl of valves to that in *Arcoscalpellum* there is a great difference structurally, for the inframedian latus overlaps the rostral and carinal latus on either side; the lower lateral plates are hardly at all specialized, for the rostral and inframedian latus are almost exactly alike in shape and size, and resemble very much the carinal latus, which, however, is about twice as large as the rostral and inframedian latus; the rostrum is comparatively very much greater in size than in any known *Arcoscalpellid*, in which latter it becomes exceedingly small or is entirely absent in the more recent forms. *Cretiscalpellum* is clearly related to *Arcoscalpellum*, but, while the valves have combined to form a somewhat similar capitulum, the individual valves, especially the carina and the lower latera, still retain their primitive structure, and have not become so specialized in shape as in *Arcoscalpellum* and the more specialized forms of *Scalpellum*, s. str.

There would seem to be some relationship also to *Calantica* (*Scillalepas*), especially in the lower whorl of valves. In *Scillalepas* there is no upper latus interposed between the scutum and tergum, the valve which is homologous with the upper latus in other forms being still a member of the lower whorl. The valves of the lower whorl in *Scillalepas* are not so differentiated in shape as in *Arcoscalpellum*, although more so than are the valves of *Cretiscalpellum*, and the median latus does not overlap the rostral and carinal latus, but on the contrary is overlapped on each side by those valves.

The structural resemblance of *Cretiscalpellum* is therefore closest to *Arcoscalpellum*, and this probably indicates not that *Arcoscalpellum* was derived from *Cretiscalpellum*, but that they had a common ancestor, which in some way was related to *Scillalepas*.

Arcoscalpellum has a known range from the Lower Cretaceous (Aptian) to Recent, *Cretiscalpellum* is known to exist still earlier in the Lower Cretaceous, for it occurs in the Neocomian, but it is not known more recent than the Danian, and *Scillalepas* has a known range from the Upper Cretaceous (Upper Senonian) to Recent, although it is probable that it existed in the Jurassic rocks.

For the loan of specimens my thanks are due to Mr. Henry Woods, F.R.S., of Cambridge University, and to Dr. F. L. Kitchin and the Director of the Geological Survey.

EXPLANATION OF PLATE V.

Scalpellum (Cretiscalpellum) unguis (J. de C. Sowerby).

Albian, Gault: Folkestone, Kent.

- Fig. 1. Part of a capitulum, showing right side, with the valves slightly displaced and the scutum, upper and rostral latus added in outline. B.M., 59802.
 Fig. 2. Carinal end of a capitulum from right side. Sedgwick Museum, Cambridge.
 Fig. 3. Associated rostral and inframedian latera (from left side). B.M., 44300.
 Fig. 4. Rostral and inframedian latera (from left side, found apart on a small piece of clay). *a*, outer view; *b*, inner view. B.M., I. 1573.
 Fig. 5. Associated rostral and inframedian latera (from left side). Origl. of Darwin's pl. iv. fig. 1 *k*. Geol. Surv. Museum, 31378.
 Fig. 6. Rostrum. Outer view. Origl. of Darwin's pl. iv. fig. 1 *e*. Geol. Surv. Museum, 31378.
 Fig. 7. Rostrum. Outer view. B.M., I. 13467.
 Fig. 8. Rostrum. Inner view. B.M., 41920.
 Fig. 9. Peduncle plate. Outer view. B.M., 44300.
 Fig. 10. Peduncle plate. Inner view of basal portion showing median elliptical socket. B.M., 44300.

Figs. 1-8, $\times 2$ diam.; figs. 9 & 10, $\times 6$ diam.

Scalpellum (Cretiscalpellum) bronni (F. A. Roemer).

Middle Neocomian, Hilsconglomerat: Essen-on-the-Ruhr, Westphalia.

- | | |
|---|--------------------|
| Fig. 11. Scutum (left). Outer view. B.M., I. 15445. | } $\times 2$ diam. |
| Fig. 12. Tergum (left). Outer view. B.M., 15446. | |
| Fig. 13. Carina. Outer view. B.M., I. 15443. | |
| Fig. 14. Carina. Inner view. B.M., I. 15444. | |
| Fig. 15. Carina. Side view. B.M., I. 15447. | |
| Fig. 16. Carina. Side view. B.M., I. 15448. | |

For explanation of lettering see legend of text-figure.

XLVI.—*Deuteroephlebia mirabilis*, *gen. et sp. n.*, a remarkable Dipterous Insect from Kashmir. By F. W. EDWARDS.

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[Plate VI.]

IN October 1921 Mr. Martin E. Mosely presented to the British Museum a few insects collected and sent to him by Mr. F. J. Mitchell, Honorary Director of Trout Culture in Kashmir; the specimens were obtained in the neighbourhood